WE CLAIM:

1. A gas turbine engine comprising:

a turbine scroll inside a combustor housing;

a forward discourager;

an aft discourager;

a B-width, measured between the forward discourager and the aft discourager;

a forward bayonet situated on the forward side of the turbine scroll;

a radial nozzle contacting the forward bayonet on the forward side of the turbine scroll at a bayonet engagement point;

an aft scroll ring;

a retaining ring securing the turbine scroll while maintaining an axial loading point on the aft scroll ring;

a forward scroll ring; and

the retaining ring restraining displacement of the forward scroll ring and the aft scroll ring.

2. The gas turbine engine of claim 1, wherein the forward discourager comprises a bending angle within the range of from about 60 degrees to about 120 degrees.

3. The gas turbine engine of claim 1, wherein the aft discourager comprises a bending angle within the range of from about 60 degrees to about 120 degrees.

4. The gas turbine engine of claim 2, wherein the forward discourager comprises a bending angle of about 90 degrees.

5. The gas turbine engine of claim 3, wherein the aft discourager comprises a bending angle of about 90 degrees.

6. The gas turbine engine of claim 1, wherein the turbine scroll further comprises four pairs of sealing surfaces.

7. The gas turbine engine of claim 1, further comprising a radial seal at the forward side of the radial nozzle and a radial seal at the aft side of the radial nozzle for sealing the radial nozzle against leaking of exhaust gas.

8. The gas turbine engine of claim 1, wherein the turbine scroll is generally coil-shaped.

9. A gas turbine engine comprising:

a turbine scroll inside a combustor housing;

a forward discourager;

an aft discourager;

a B-width, measured between the forward discourager and the aft discourager;

a forward axial seal adjacent to the forward discourager;

an aft axial seal adjacent to the aft discourager;

the forward discourager comprising a 90-degree bending angle;

the aft discourager comprising a 90-degree bending angle;

a radial nozzle engaged with a forward bayonet on the forward side of the turbine scroll;

the forward bayonet contacting the radial nozzle at a bayonet engagement point;

an aft scroll ring;

a retaining ring adjacent the aft scroll ring;

the retaining ring securing the turbine scroll while maintaining an axial loading point on the aft scroll ring; and

a forward scroll ring;

the retaining ring restraining displacement of forward scroll ring and the aft scroll ring.

10. The gas turbine engine of claim 9, wherein the turbine scroll further comprises four pairs of sealing surfaces.

11. The gas turbine engine of claim 9, further comprising a radial seal at the forward side of the radial nozzle and a radial seal at the aft side of the radial nozzle for sealing the radial nozzle against leaking of exhaust gas.

12. A gas turbine engine comprising:

a turbine scroll inside a combustor housing;

the turbine scroll comprising four pairs of sealing surfaces;

a B-width, measured between a forward discourager and an aft discourager;

a forward bayonet adjacent the forward side of the turbine scroll;

the forward bayonet contacting a radial nozzle at a bayonet engagement point

a retaining ring adjacent an aft scroll ring;

the retaining ring securing the turbine scroll while maintaining an axial loading point on the aft scroll ring; and

a forward scroll ring;

the retaining ring restraining displacement of the forward scroll ring and the aft scroll ring.

13. The gas turbine engine of claim 12, wherein the turbine scroll is generally coil-shaped.

14. A gas turbine engine comprising:

a compressor section;

a combustor section;

a compressor scroll;

a turbine scroll inside a combustor housing;

a forward discourager;

an aft discourager;

a B-width, measured between the forward discourager and the aft discourager;

a forward axial seal adjacent to the forward discourager;

an aft axial seal adjacent to the aft discourager;

the forward discourager and the aft discourager comprising a 90-degree bending angle for flow restriction;

a radial nozzle engaged with a forward bayonet on the forward side of the turbine scroll in six locations;

the forward bayonet contacting the radial nozzle at a bayonet engagement point;

a radial seal on the forward side of the B-width;

a radial seal on the aft side of the B-width;

a retaining ring adjacent an aft scroll ring;

the retaining ring securing the turbine scroll while maintaining an axial loading point on the aft scroll ring; and

a forward scroll ring;

the retaining ring restraining displacement of forward scroll ring and the aft scroll ring.

15. The gas turbine engine of claim 14, wherein the turbine scroll is generally coil-shaped.

16. The gas turbine engine of claim 16, wherein the turbine scroll comprises four pairs of sealing surfaces.

17. A method for preventing a gas turbine engine of an auxiliary power unit from choking at high speed, comprising:

introducing a portion of the exhaust gas of an associated turbine engine through a radial nozzle;

maintaining a constant B-width size;

securing a retaining ring on the aft side of a turbine scroll while maintaining an axial loading point on the aft side of a scroll ring; and,

restraining displacement of the turbine scroll by the retaining ring.

18. The method of claim 17, wherein the introducing step further comprises diverting the flow direction of the portion of the exhaust gas of an associated turbine engine by an angle within the range from about 60 degrees to about 120 degrees.

19. The method of claim 18, wherein the introducing step further comprises diverting the flow direction of the portion of the exhaust gas of an associated turbine engine by about 90 degrees.

20. The method of claim 17, further comprising sealing the forward side of a radial nozzle and sealing the aft side of the radial nozzle.

21. The method of claim 17, wherein the turbine scroll comprises four pairs of sealing surfaces.

22. The method of claim 17, wherein the turbine scroll is generally coil-shaped.